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16(1)

AUTHOR:

Eydus, D.M.

SOV/20-125-3-11/63

TITLE:

On the Principle of the Limit Absorption (O printsipe predel'nogo pogloshcheniya)

PERIODICAL:

Doklady Akademii nauk SSSR, 1959, Vol 125, Nr 3, pp 508-511 (USSR)

ABSTRACT:

According to the principle of the limit absorption the boundary value of that solution of

$$(3) \quad g u = (\lambda + \varepsilon i) u + f$$

which satisfies (2) and belongs to  $L_2$  is denoted as the solution of the boundary value problem

$$(1) \quad g u = - \sum_{i,j=1}^3 \frac{\partial}{\partial x_i} (a_{ij}(x) \frac{\partial u}{\partial x_j}) + q(x) u = \lambda u + f(x)$$

$$(2) \quad u|_{\Gamma} = 0$$

where (1) is elliptic and  $\Gamma$  the boundary of the infinite domain  $\Omega$  in which (1) is defined. The principle is proved in some special cases by A.G. Sveshnikov [Ref 1,2] and by A.Ya. Povzner [Ref 3]. The author devotes the present paper to the proof

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On the Principle of the Limit Absorption

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of the principle in the case of a finite domain  $\Omega$  or in the case of an  $\Omega$ , the infinite part of which is a cylinder. Also in a special case then the principle of the limit amplitude of A.N. Tikhonov and A.A. Samarskiy [Ref 5] is considered. Altogether there are formulated 7 theorems without proof. The author mentions a paper of O.A. Ladyzhenskaya [Ref 6, 7]. There are 7 references, 6 of which are Soviet, and 1 English.

PRESENTED: December 18, 1958, by V.I. Smirnov, Academician

SUBMITTED: December 10, 1958

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S/039/62/057/001/001/002  
B125/B112

AUTHOR: Eydus, D. M. (Leningrad)

TITLE: The problem of limiting absorption

PERIODICAL: Matematicheskiy sbornik, v. 57 (99), no. 1, 1962, 13-44

TEXT: The elliptic differential equation 
$$gu \equiv - \sum_{k,l=1}^m \partial/\partial x_k (a_{kl}(x) \partial u/\partial x_l) + q(x)u = \lambda(u) + f(x) \quad (1)$$
 with the boundary condition  $u|_{\Gamma} = 0$  is considered in an unbounded region  $\Omega$  of the  $m$ -dimensional space  $R_m$ .  $\Gamma$  is the boundary of the region  $\Omega$ , and  $\lambda$  is a point of the continuous spectrum of the operator considered in the complex space  $L_2(\Omega)$ . The solution to the equation  $gu = (\lambda + \epsilon i)u + f$ , which satisfies the condition  $u|_{\Gamma} = 0$  and pertains to  $L_2(\Omega)$ , is designated as a limit for  $\epsilon \rightarrow +0$  or  $\epsilon \rightarrow -0$ . Among other results, an extension of the classical theorems for an unambiguous solution to the external Dirichlet problem of the Helmholtz equation makes it possible to establish a general differential equation for an unbounded

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The problem of limiting absorption

region with any finite boundary. The solution of  $\bar{C}u = \lambda u + f$ , which satisfies the condition of emission  $\lim_{\rho \rightarrow \infty} \int_{S_\rho} |(\partial u / \partial r) - i\sqrt{\lambda}u|^2 dS = 0$  (24), is unambiguous

for  $\lambda \in A$ . Here,  $Cu = (\lambda + \varepsilon i)u + f$ , and  $A$  is the set of all positive  $\lambda$ . For  $\lambda \in 0$  the solution  $u_\varepsilon$  of the equation  $Cu = (\lambda + \varepsilon i)u + f$  tends to the solution for the equation  $\bar{C}u = \lambda u + f$  which satisfies condition (24). The problem of the limiting amplitude is now considered in its application to the equation  $d^2 w / dt^2 + Gw = fe^{-i\sqrt{\lambda}t}$  (50) with the initial conditions  $w|_{t=0} = \xi_1, dw/dt|_{t=0} = \xi_2$  (51). Under limiting conditions the problem (50)-(51) has such a solution for  $\lambda = 0$  that  $\lim_{t \rightarrow +\infty} we^{i\sqrt{\lambda}t} = u_+(x, \lambda)$ .

Convergence is uniform in every internal bounded region  $w \in \Omega$ . All that has been said above applies especially to a region  $\Omega$  consisting of  $\Omega'$  and  $\Omega''$ , which is designated as a "cylindrical tube." The finite part  $\Omega'$  is enclosed by a sphere, and  $\Omega''$  is a semi-infinite cylinder.

SUBMITTED: September 19, 1960

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BDS/EWT(d)/FCC(w)

AFFTC

IJP(C)

S/043/63/007/002/007/008

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AUTHOR: Eydus, D. M.

TITLE: The principle of limiting absorption in the theory of resilience

PERIODICAL: Leningrad. Universitet. Vestnik, no. 7. Seriya matematiki, mekhaniki i astronomii, no. 2, 141-154

TEXT: Employing the following terminology,

$\Omega$  is an infinite region (in the article, region means open set) of variables  $x_1, x_2, x_3$ , which appears as the externality of a closed piecewise continuously differentiable surface,  $\Gamma$ ,  $\Gamma'$  is a certain closed surface located within  $\Omega$  and dividing  $\Omega$  into two portions (1) and (2), with (1) denoting a finite region and (2) an infinite one,  $\lambda$  and  $\mu$  are two piecewise constant functions assigned within  $\Omega$ , with  $\lambda = \lambda_k, \mu = \mu_k$  in  $\Omega^{(k)}$ , and  $k = 1, 2$  and  $\lambda_k, \mu_k$  being positive constants,

the author sets himself the problem of finding within region the displacement

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The principle of limiting ....

vector  $U$ , which satisfies the equation

$$\Delta U \equiv -\mu \Delta U - (\lambda + \mu) \operatorname{grad} \operatorname{div} U = \sigma U + F(x),$$

where  $x$  is a point in region  $\Omega$ ,  $\sigma$  is a positive constant to the boundary condition in

$$[T(U)]_r = 0$$

where  $[T(U)]_r$  is the tension vector on the boundary of  $\Gamma$ , to conditions of conjugation in  $\Gamma'$

$$[U]_{\Gamma'}^{(1)} = [U]_{\Gamma'}^{(2)}$$

$$[T(U)]_{\Gamma'}^{(1)} = [T(U)]_{\Gamma'}^{(2)}$$

and to a certain condition of radiation at infinity.

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EYDUS, D.M.

Some boundary value problems in infinite regions. Izv. AN  
SSSR. Ser. mat. 27 no.5:1055-1080 8-0 '63. (MIRA 16:11)

EYDUS, D.M.

Principle of limit amplitude. Dokl. AN SSSR 158 no.4:794-797  
O '64. (MIRA 17:11)

1. Rostovskiy gosudarstvennyy universitet. Predstavleno akademikom  
V.I. Smirnovym.



EXDUS, G.S. EXDUS, G.S.

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✓ 1470. THEORY AND CALCULATION OF A TRANSITRON OSCILLATOR. N.I. Steyn and G.S. Eidelman. Radiotekhnika, Vol 10, No. 7, 58-62 (1955). In Russian. A detailed mathematical analysis of the transitron operation is given, assuming simplified linear anode and screen grid current characteristics in the negative-resistance region. It is shown that the good frequency-stability of transitrons is mainly due to absence of phase effects caused by the feedback coupling in conventional oscillator circuits. On the other hand the efficiency is low (2 to 10%). Several transitron characteristics of the GU 50 pentode are measured and plotted, including amplitude across the tuned circuit, screen grid voltage and anode voltage, and good agreement with calculated results is obtained. A. Landman

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SOV/141-1-5-6-21/28

**AUTHORS:** Tsetlin, M.L. and Eydus, G.S.

**TITLE:** Algebraic Method of Synthesis of the Circuits Based on Bistable Trigger Units

**PERIODICAL:** Izvestiya vysshikh uchebnykh zavedeniy, Radiofizika, 1958, Vol 1, Nr 5-6, pp 166 - 176 (USSR)

**ABSTRACT:** The algebraic method of synthesis of the so-called non-primitive circuits was described by one of the authors (M.L. Tsetlin - Ref 2) in an earlier article. Here, the method is applied to the systems employing bistable triggers and the theory presented assumes that the reader is familiar with the earlier article. The systems considered are suitable for the processing of the information which is periodically applied to inputs of the device. Since the absolute time scale is of no particular importance, it is assumed that the time changes in steps (0, 1, 2 and so on). It is also assumed that the input signals of the system or its output signals have only two levels (binary systems). The system has  $n + s$  input busbars  $x^1, x^2, \dots, x^{n+s}$  and  $p+s$  output terminals  $f^1, \dots, f^{p+s}$ . The system is primitive if the state of

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the output terminals at the instant  $t$  is determined by the state of the input terminals at the same instant. For this case, the equation relating the states of the input and output terminals is in the form of:

$$f_t^i = f^i(x_t^1, \dots, x_t^{n+s}), \quad i = 1, 2, \dots, p+s \quad (1).$$

However, Eq (1) is inadequate for the description of real systems which contain parasitic capacitances and inductances, and produce delays between the input and output signals. The delays are disregarded in this work. If the output terminals of the device are connected with the input busbars by means of delay elements (as shown in Figure 1), a non-primitive system with  $s$  feedback paths is obtained; the symbol  $s$  denotes the number of delay elements. If the states of the input terminals  $x^{n+1}$  at the instant  $t+1$  is denoted by  $\varphi_t^i$  and the state of the output

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Trigger Units

terminals  $f^{p+i}$  is  $\varphi_{t+1}^i$ , the system can be described by Eqs (2). The properties of the equations are analysed in detail and it is shown that an arbitrary equation of a non-primitive system can be realised by means of trigger circuits. The theory is used to design a converter which converts an ordinary binary code into a Grey code. The device is illustrated schematically in Figure 3. A binary difference counter is also designed; the system has two input terminals and its detailed circuit diagram is shown in Figure 5. A reversing ring counter is also designed and its circuit is shown in Figure 6. The circuits of Figures 5 and 6 were tested experimentally. The authors express their gratitude to G.A. Levin for his interest in this work. There are 6 figures and 7 Soviet references; 1 of the references is translated from English.

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Algebraic Method of Synthesis of the Circuits Based on Bistable  
Trigger Units

ASSOCIATION: Moskovskiy gosudarstvennyy universitet (Moscow State  
University)

SUBMITTED: First submitted to the editor of the journal  
"Elektrosvyaz'" - January 15, 1958  
Submitted to the editor of this journal -  
June 23, 1958

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AUTHORS: Tsetlin, M.L. and Eydus, G.S. SOV/106-58-4-7/16

TITLE: A Matrix Method for Synthesis of Multi-branch, Relay-  
contact Switching and Control Systems (Matrichnyy metod  
sinteza mnogotaknykh releyno-kontaknykh skhem svyazi  
i upravleniya)

PERIODICAL: Elektrosvyaz', 1958, Nr 4, pp 41 - 48 (USSR)

ABSTRACT: The author gives a matrix method of analysis and  
synthesis of relay-contact switching circuits together with  
several examples of its application.  
A relay-contact system containing  $s$  electromagnetic relays  
 $\phi_1, \dots, \phi_s$ ,  $n$  control elements (push-buttons, switches,  
contacts)  $X_1, \dots, X_n$  and  $p$  output lines  $f_1, \dots, f_p$  is  
considered. The sequence in which the relays are switched and,  
consequently, the sequence of application of voltage to the  
output lines depends on the action of the control elements and  
is determined by the circuit arrangement. The number 1 is  
allotted to the energized state of a relay and 0 to the de-  
energized state. A circuit containing  $s$  relays can have,  
in all  $2^s$  states. These states are conveniently written  
in the form  $\beta_s, \dots, \beta_1$ , where  $\beta_k (k = 1, 2, \dots, s)$  can have

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a value 0 or 1. For example, if all the relays are de-energised, the state of the circuit can be symbolised by 0, 0, ..., 0 ( $\beta_1 = \beta_2 = \dots = \beta_s = 0$ ). If the 1st and 3rd relays are energised, the state changes to 0, 0, 0, ... 0, 1, 0, 1 ( $\beta_1 = \beta_3 = 1$ , the remaining values equalling 0). All the states are numbered 0, 1 ...,  $2^s - 1$  and the state numbered  $k$  is written in binary form  $\beta_s, \dots, \beta_1$ , the commas indicating that this is a binary number and not a product. Let the circuit at some instant of time be in the state  $k$ . Due to the action of the control elements (push buttons) the state changes to the  $l$ th state ( $l = 0, 1, \dots, 2^s - 1$ ). This action can be represented as some function of the variables  $x_1, \dots, x_n$  and denoted by  $a_{kl}(x_1, \dots, x_n)$ , so that the change-over from the  $k$ th state to the  $l$ th state occurs always, and only, when the values of the variables  $x_1, \dots, x_n$  are such that  $a_{kl}(x_1, \dots, x_n) = 1$ . Conversely, if  $a_{kl}(x_1, \dots, x_n) = 0$ , then the corresponding change-over

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cannot occur.

The values  $a_{kl}$  are written in matrix form:

$$A = \begin{pmatrix} a_{0;0} & a_{0;1} & \dots & \dots & \dots & a_{0;2^s-1} \\ \vdots & \vdots & \vdots & \vdots & \vdots & \vdots \\ \vdots & \vdots & \vdots & \vdots & \vdots & \vdots \\ a_{2^s-1;0} & a_{2^s-1;1} & \dots & \dots & \dots & a_{2^s-1;2^s-1} \end{pmatrix} \quad (1)$$

Then the condition for change-over from the  $k^{\text{th}}$  to the  $l^{\text{th}}$  state, denoted by  $a_{kl}(x_1, \dots, x_n)$  is located at the intersection of the  $k^{\text{th}}$  line with the  $l^{\text{th}}$  column. The elements  $a_{\alpha_s}, \dots, a_{\alpha_1}; \beta_s, \dots, \beta_1(x_1, \dots, x_n)$  are functions of the control elements  $x_1, \dots, x_n$ . The letter  $x_1$  represents contacts which are closed when the button  $X_1$  is pressed and opened when it is released. Similarly,

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$\overline{x}_1$  represents contacts which are open when the button  $X_1$  is pressed and closed when it is released. Closed contacts are represented by 1, and open contacts by 0. Thus, if button  $X_1$  is pressed,  $x_1 = 1$ ,  $\overline{x}_1 = 0$ ; if  $X_1$  is released,  $x_1 = 0$ ,  $\overline{x}_1 = 1$ .

Functions  $\alpha_s, \dots, \alpha_1; \beta_s, \dots, \beta_1(x_1, \dots, x_n)$  are formed from the values  $x_1, \dots, x_n$  by the basic operations:

logical addition, multiplication and negation (Ref 5). For example, if, initially, all the relays are disconnected and to switch in the  $s^{\text{th}}$  relay only, it is necessary to press buttons  $X_1$  and  $X_2$  and not to press  $X_3$ , then:

$$a_{0,0, \dots, 0; 1, 0, 0, \dots, 0}(x_1, x_2, x_3) = (x_1 \vee x_2) \overline{x_3}$$

where  $\vee$  denotes the logical summation.

It can be proven (Refs 9, 10) that the matrix of the states

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of relay-contact systems satisfies the following conditions:

- 1) The logical sum of the elements of any line equals 1:

$$\bigvee_{\beta_s, \dots, \beta_1} a_{k;l} = \bigvee_{\alpha_s, \dots, \alpha_1} a_{\alpha_s, \dots, \alpha_1; \beta_s, \dots, \beta_1} (x_1, \dots, x_n) = 1 \quad (2)$$

- 2) The product of elements in different columns of one line equals 0:

$$a_{k;l_1} a_{k;l_2} = 0; \quad l_1 \neq l_2 \quad (3)$$

Such matrices are called "simple" matrices.

On the circuits, the letter  $\phi_i$  denotes the winding

of the  $i^{\text{th}}$  relay,  $\phi_i$  - the closed contacts and  $\overline{\phi_i}$  -

the open contacts, when the relay is switched into circuit.

Closed contacts are represented by 1 and open contacts by

0. The presence or absence of voltage on the winding of the relay  $\phi_i$  is denoted by the value of  $\phi_i$  ( $\phi_i = 1$  or

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$\phi_1 = 0$ , respectively). If the voltage is applied to the relay  $\phi_1$  but its contacts have not changed over, then  $\phi_1 = 1; \psi_1 = 0; \overline{\psi_1} = 1$ . After an interval of time necessary for operation of the relay, the contacts change over and then  $\phi_1 = 1; \psi_1 = 1; \overline{\psi_1} = 0$ . (The values  $\psi_1, \overline{\psi_1}, x_1, \overline{x_1}, \phi_1$  depend on time and in Refs 9, 10, this is accounted for by an additional index  $t$ . For simplicity, this is not used in this work.) The conditions for switching in the  $i^{\text{th}}$  relay are functions of the states of the control elements and the circuit relay contacts and are written in the form:

$$\phi_i = \phi_i(x_1, \dots, x_n; \psi_1, \dots, \psi_s) \quad (4)$$

From Eq.(4), a single-valued matrix of the circuit states is established, i.e. the matrix elements

$\alpha_s, \dots, \alpha_1; \beta_s, \dots, \beta_1(x_1, \dots, x_n)$  are found by the

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formula:

$$a_{\alpha_s, \dots, \alpha_1; \beta_s, \dots, \beta_1}(x_1, \dots, x_n) = \prod_{i=1}^s [\phi_i(x_1, \dots, x_n; \alpha_1, \dots, \alpha_s)]^{\beta_i} \quad (5)$$

Thus, to find the element  $a_{\alpha_s, \dots, \alpha_1; \beta_s, \dots, \beta_1}$

it is necessary to form the logical product from expressions of the type (4), replace  $\varphi_i$  by  $\alpha_i$  and take the logical negation in those cases where  $\beta_i = 0$ .

If the circuit has output lines  $f_1, \dots, f_p$ , then the presence of voltage on the  $i^{\text{th}}$  line is also a function of the state of the control elements and relay contacts, which can be presented in the form:

$$f_i = f_i(x_1, \dots, x_n; \varphi_1, \dots, \varphi_s) \quad (6) .$$

The application of the above method is demonstrated by the analysis of an example circuit.

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A Matrix Method for Synthesis of Multi-branch, Relay-contact Switching and Control Systems

The author next considers the synthesis of relay-contact systems, i.e. obtains a circuit which will meet given requirements. Insofar as the states matrix completely describes the circuit operation, the problem of synthesis of the circuit consists of finding the states matrix by which the relay switching functions (of the Eq.(4) type) are determined and hence the circuit itself is determined. For any simple matrix:

$$A = \parallel a_{\alpha_s, \dots, \alpha_1; \beta_s, \dots, \beta_1}(x_1, \dots, x_n) \parallel$$

a single valued circuit can be established and the switching function of the  $i^{\text{th}}$  relay can be obtained by the relationship:

$$\phi_i(x_1, \dots, x_n; \varphi_1, \dots, \varphi_s) = \bigvee_{\alpha_s, \dots, \alpha_1; \beta_s, \dots, \beta_1} a_{\alpha_s, \dots, \alpha_1; \beta_s, \dots, \beta_1}(x_1, \dots, x_n) [$$

$$\text{Card8/9} \quad [\varphi_1]^{\alpha_1} \dots [\varphi_s]^{\alpha_s} \cdot \quad (13)$$

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Switching and Control Systems

in which:

$$[\varphi_i]^1 = \varphi_i, [\varphi_i]^0 = \overline{\varphi_i} \quad (14)$$

Application of the method is demonstrated by synthesis of  
an example circuit.

There are 4 figures and 11 references, of which 9 are  
Soviet and 2 English.

SUBMITTED: July 10, 1957

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1. Switching circuits--Mathematical analysis 2. Control  
systems--Mathematical analysis 3. Relays--Applications

ZIN'KOVSKIY, Abram Isaakovich; EYDUS, G.S., red.

[Radio engineering experiments] Radiotekhnicheskii  
eksperiment. Moskva, Izd-vo "Energia," 1964. 118 p.  
(MIRA 18:2)

EYDUS, G.S.; MARKOV, V.V.; VENEDIKTOV, M.D.

Asynchronous address communication systems; a survey.  
Probl. pered. inform. 1 no.4:3-19 '65.

(MIRA 18:12)

1. Submitted May 18, 1965.



USSR/Physics - Single Crystal Properties

FD-3343

Card 1/1

Pub. 146-15/23

*Eydus, I. M.*

Author : Stepanov A. V. and Eydus I. M.

Title : Relation of Elasticity constants of single crystals of sodium chloride and silver chloride to temperature

Periodical : Zhur. Eksp. i Teor. Fiz., 29, No 5, 669-675, 1955

Abstract : Research, started in previous works by A. V. Stepanov (Sov. Phys. 6, 312, 1934; ibid. 8, 25, 1935; Zhur. Tekh. Fiz., 19, 205, 1949; ZhETF 25, 98, 1953) is continued. Results of determinations of elasticity constants of single crystals of sodium chloride and of silver chloride are tabulated in a temperature range from room temperature to the melting point. Indebted to Ye. M. Yevstaf'yev, and A. L. Shakh-Budagov for discussions. Thirteen references, including five foreign.

Institution : Leningrad Physico-Technical Institute, Acad. Sci. USSR

Submitted : March 26, 1953

EYOUS, I.M.

Dependence of the elastic constants of single crystals of  
sodium chloride and silver chloride on temperature  
and M. Hillis  
J. Appl. Phys. 40, 1, 1969

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EYDUS, I.R.

Neurinoma of the external ear. Vest. otorinolar., Moskva 15 no.2:86  
Mar-Apr 1953. (CIML 24:3)

1. Of the Department for Diseases of the Ear, throat, and Nose (Head  
— Prof. N. A. Karpov), Leningrad Medical Stomatological Institute.

EYDUS, I.R.

Influence of radiotherapy on the healing of surgical wounds  
following laryngectomy. Zhur. ush., nos. 1 gorl. bol. 20  
no. 3:38-41 My-Je '60. (MIRA 14:4)

1. Iz otorinolaringologicheskogo otdeleniya (zav. - prof. N.A.  
Karpov) Instituta onkologii AMN SSSR.  
(LARYNX--CANCER) (RADIOTHERAPY)

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S/020/60/135/006/033/037  
B016/B060

AUTHORS: Eydus, L. Kh. and Kayushin, L. P.

TITLE: Lasting Conservation of Unpaired Electrons in Macromolecules  
Upon Irradiation of Proteic Solutions

PERIODICAL: Doklady Akademii nauk SSSR, 1960, Vol. 135, No. 6,  
pp. 1525-1527

TEXT: The authors have applied the method of electron paramagnetic resonance (e.p.r.) to prove the ability of protein molecules (myosin and pepsin, which have quite different properties in many respects) to conserve unpaired electrons in aqueous solutions for a long time. Myosin was extracted by Lyubimova's method (not described in the text) from rabbit muscles (concentration: 10 mg/ml) and irradiated with a  $\text{Co}^{60}$  gamma dose of  $0.5 \cdot 10^6$  r in a 0.5 M KCl solution. Pepsin was irradiated by Nortrop's (Northrop) method as modified by G. A. Levdikova (Ref. 13) with a dose of  $3 \cdot 10^6$  r in 0.2 M acetate buffer (concentration: 5 mg/ml) at pH 4.8. The radiation doses corresponded to a loss in the activity of ferments of

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Lasting Conservation of Unpaired Electrons  
in Macromolecules Upon Irradiation of  
Proteic Solutions

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about 80%. The irradiated solutions were dried out and pulverized. The e.p.r. was measured by a radiospectrometer with a double modification of the magnetic field (upper modulation frequency 465 kc/sec). The first derivatives of the absorption lines were recorded by an  $\text{DM}-09$  (EPP-09) self-recorder. Fig. 1 shows the measurement results. The e.p.r. spectra of the two irradiated substances constitute singlet signals. Their factor of spectroscopic splitting approaches the g-factor of 1,1-diphenyl picryl hydrazine. The distance between points of maximum inclination is 14.5 gauss in myosin, and 17.5 gauss in pepsin. Such signals were not observed in the control preparations. The same ferment solutions were incubated in a warm ambient prior to drying after irradiation (myosin 24 h at 20°C, pepsin 6 h at 54°C). According to results supplied by an earlier paper, the "thermal" after-effect of irradiation is observed with such an incubation, as a part of the protein with hidden damage loses its fermentative activity. The incubation process was complete, and the remaining degree of activity was therefore no more altered by additional incubation. It was observed from curves A, b, and B, b (Fig. 1) that no more unpaired electrons could be proved to exist after the mentioned

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Lasting Conservation of Unpaired Electrons  
in Macromolecules Upon Irradiation of  
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inactivation in the proteins. The same conservation of unpaired electrons was established with the photodynamic effect. The duration of exposure with visible light (2 bulbs 300 watts each) corresponded to about the loss of half the ferment activity. Results are shown in Fig. 2. No similar e.p.r. signals were observed in the control preparation. The authors conclude that their results confute the principal objection against the hypothesis of an "after-effect" of radiation damage, namely, the unlikelihood of the appearance of unpaired electrons in diluted proteic solutions. G. K. Otarova and M. K. Pulatova are thanked for their assistance. There are 2 figures and 13 references: 10 Soviet, 2 US, and 1 British. X

ASSOCIATION: Institut biologicheskoy fiziki Akademii nauk SSSR (Institute of Biophysics of the Academy of Sciences USSR)

PRESENTED: October 5, 1960, by N. M. Sisakyan, Academician

SUBMITTED: September 16, 1960

Card 3/3

EYDUS, M.S.

~~EYDUS, M.S.~~, ADAMOVICH, M.I., IVANOVSKAYA, I.A., NIKOLAYEV, V.S., TULYAKINA, M.S.

Cosmic Rays

Spatial distribution of penetrating particles in atmospheric showers of cosmic rays.  
Zhur. eksp. i teor. fiz. 22 no. 4, 1952.

9. Monthly List of Russian Accessions, Library of Congress, November 195<sup>2</sup>~~6~~, Uncl.



(A) A

Absorption in lead of the particles of atmospheric cosmic-ray showers. G. T. Zaturpin and L. Kh. Bida (P. N. Lebedev Phys. Inst., Acad. Sci. U.S.S.R., Moscow). *Zhur. Eksp. Teor. Fiz.* 17, 937-8(1947).—

Measurements made during the 1946 Pamir expedition at 3000 m. with part of the Pb screens replaced by Al showed the absorption in the Al to correspond to an absorption in a Pb layer equiv. to the Al, not with regard to ionization losses, but with regard to radiation losses. This shows the electron-photon character of the shower. The broad dense atm. showers observed under 12-16 cm. Pb evidently consist of high-energy electrons, not of mesons. Generation of mesons within the Pb is, however, not excluded. The expts. confirm the presence of broad meson showers of low d., apparently genetically related to Auger showers. However, the existence of a large no. of broad dense meson showers, or of dense meson accumulations in Auger showers, is not confirmed. N. Thon

1564. Investigation of the Penetrating Ability of Particles of Atmospheric Showers of Cosmic Rays, by G. T. Zatsopin and L. Kh. Eidua. Zhurnal Eksperimental'noi i Teoreticheskoi Fiziki 18, p. 259-267, 1948. (IN Russian)

The absorption in aluminum and lead of particles of wide atmospheric showers at a height of 3860 m above sea level was investigated by means of counters. Particles of the shower penetrating 12 cm of lead were identified with the electron-photon component of high energy of Auger showers. Some evidence was obtained of the possibility of the existence of wide showers of mesons of small density. On the basis of the study of the penetrating ability of the particles of narrow showers, the authors deduced the existence of two forms of particles in these showers.

NIKOLAI, L. KH.

Birger, N. G., Veksler, V.I., Dobroshin, N.A., Zatsepin, G.T., Karnosovs, L. B.,  
Limbimov, A.L., Rozental, I.A., and Eidus, L. Kh. P. 826

The main results of a series of experiments (in which electron nuclear showers were discovered and investigated) which the authors have been working on for a number of years are presented. The electron nuclear showers originated at nuclear interactions of very high energies (from  $10^6$  eV and above) and also from the nuclear-cascade process in cosmic rays. These two phenomena make it possible to explain basically the whole picture of processes occurring in cosmic rays.

The L. N. Lebedev Inst. of Physics, Acad. of Sci., USSR  
May 23, 1949

SO: Journal of Experimental and Theoretical Physics, (USSR) 19, No. 9 (1949)

<p>198 Investigation of the Density Spectrum of Extensive Atmospheric Showers of High Density. V. P. Zakharenova and L. Kh. Elisei, Doklady Akad. Nauk S.S. S. R. 65, 477-9(1960) (in Russian).</p> <p>All investigations on the distribution of densities <math>p</math> in extensive atmospheric showers agree upon an exponential relationship <math>N(&gt;p) = A/p^k</math>, <math>A</math> and <math>k</math> depending on the altitude and the experimental set-up. Thus, Zatsopina et al (Zhur. Eksp. i Teoret. Fiz. 17, 1125(1947)) have found, at 3000 m altitude, for the density range 3-300 particles/m<sup>2</sup>, <math>k = 1.43</math>. However, a more careful study of their data showed a certain dependence of <math>k</math> on <math>p</math>. In the present work, high density showers up to 5,000 particles/m<sup>2</sup> were investigated by combining the method of ratios <math>C_3/C_2</math> between the numbers of triple and sextuple coincidences with the method of varying counter areas <math>s</math>, for a given <math>C</math>. This latter procedure clearly showed the increased steepness of the slope of the line <math>\log C = f(\log s)</math> in the region of high densities. The value of <math>k</math> obtained by both methods is <math>1.76 \pm 0.12</math>. Theoretically, the increase of <math>k</math> with growing <math>p</math> is in agreement with the constancy of the exponent <math>\gamma</math> in the energy spectrum of primary particles (Migdal, Zhur. Eksp. i Teoret. Fiz. 15, 313(1945)); up to energies <math>10^{13}</math>-<math>10^{15}</math> ev, the values of <math>k</math> here given will correspond to <math>\gamma = 1.7</math> to 1.8.</p>	
<p>ASB-16A METALLURGICAL LITERATURE CLASSIFICATION</p>	

USSR/Nuclear Physics - Cosmic Radiation Apr 49  
Nuclear Physics - Geiger Counters

"Study of the Density Spectrum of Wide, Very Dense  
Atmospheric Showers," V. P. Zakharova, L. Kh.  
Lydas, Phys Inst Imeni P. M. Lebedev, Acad Sci  
USSR, 3 pp

"Dok Ak Nauk SSSR" Vol LXV, No 4

Results of further measurements of the density  
spectrum of wide atmospheric showers in the region  
of very great densities (up to 5,000 particles per  
sq m). Arrangement of Geiger counters used regis-  
tered three- and six-repeated discharge

41/49T95

USSR/Nuclear Physics - Cosmic Radia- Apr 49  
tion (Contd)

coincidences in self-quenching counters, and was  
placed in a horizontal plane around a circle with  
a 1.5-meter diameter at a distance of 0.5 meter  
from the lightweight roof of the plywood box (ap-  
proximately 0.5 g/sq cm). Submitted by Acad D. V.  
Skobel'tsyn, 31 Jan 49.

ENDUS, L. KH.

41/49T95

USSR/Nuclear Physics - Cosmic Radiation Apr 49  
Nuclear Physics - Ionization Chambers

"Study of the Structure of Wide Atmospheric  
Cosmic-Ray Showers," G. Ya. Artukhovich, L. Kh.  
Kydus, Phys Inst Imeni P. N. Lebedev, 3 pp

"Dok Ak Nauk SSSR" Vol LXV, No 5

Previous study of two ionization chambers  
established that the number of coincidence  
pulses caused by wide showers, were generally  
different, and that the difference increased with  
increase in distance between chambers. Inequal-  
ity of pulses could be caused both by heavy,  
strongly ionizing particles existing in the

39/49T98

USSR/Nuclear Physics (Contd)

Apr 49

showers generated in the atmosphere or in the  
chamber walls, and by the presence of the fine  
structure of atmospheric showers. i.e., "fine  
dense pencils of relativistic particles on a back-  
ground of low-density showers. Author attempts  
to determine predominance of one of these  
causes. Submitted by Acad D. V. Skobel'tsyn  
15 Feb 49.

39/49T98

131 AND 132 SERIES		133 AND 134 SERIES	
PROCESSES AND PROPERTIES INDEX			
N		8	
<p>214 Studies on the Structure of Extensive Atmospheric Showers. G. Ya. Artyukhov and L. Kh. Efdue, <u>Doklady Akad. Nauk S.S.S.R.</u> 68, 626-31 (1960) (in Russian).</p> <p>In the light of recent investigations, the extensive atmospheric showers cannot be considered as mere cascades of electrons and photons; the part played by heavy penetrating and strongly ionizing particles in the generation and further history of these showers is being increasingly emphasized. However, the experiment of two ionization chambers (Rasorenov et al, <u>Doklady Akad. Nauk S.S.S.R.</u> 60, 1531 (1948)) recording, as a rule, pulses of unequal intensity, can be interpreted not only as a proof of the presence of heavy particles, but also as an indication of some narrow dense beams of relativistic particles present in the general structure of an extensive shower of lesser density. In order to decide between the two possibilities, the authors measured coincidences <math>C_0</math> and <math>C_{10}</math> in two groups of six counters radially arranged. By using brass filters and by varying the distance between the two counter groups, the conclusion was reached that the presence of narrow showers alone cannot account for the inequality of pulses in two ionization chambers placed in an extensive atmospheric shower.</p>			
ASB-5LA METALLURGICAL LITERATURE CLASSIFICATION			
131 AND 132 SERIES		133 AND 134 SERIES	
131 AND 132 SERIES		133 AND 134 SERIES	

EIDUS, L.

1689. Investigation of the nature of particles in "peculiar" showers of cosmic radiation. N. Birger and L. Eidus. Doklady Akad. Nauk. S.S.S.R., 65, No. 6, 217-22 (1949) Apr. (in Russian).

This article describes the methods used and the results of investigations on the nature of the particles generated in "peculiar" cosmic ray showers. The article lists the numbers of particles generated in various energy levels, with the exception of those whose impetus was in excess of 60 Mev. The following particles have been observed: photons, protons, particles with a mass less than that of protons, secondary mesons, and slow mesons. A diagram of the apparatus used in the investigation is included, as is also a Wilson chamber photograph showing the path of two particles.

*Phys. Inst. in P. N. Lebedev AS USSR.*



EYDUS, L. KH.

USSR/Nuclear Physics - Radiation  
Cosmic electron-photon Component

21 Sep 49

"Formation of High-Energy Electrons and Photons in the Lower Atmospheric Strata by Cosmic Radiation," Ya. G. Artukhov, G. T. Zatsepin, L. I. Sarycheva, L. Kh. Eydus, Phys Inst imeni P. N. Lebedev, Acad Sci USSR, 34 pp

"Dok Ak Nauk SSSR" Vol LXVIII, No 3

Describes study of high-energy electron-photon component conducted in summer 1948 on the Pamirs. According to experimentally confirmed hypothesis, secondary nuclear-active particles are formed when special showers are generated, causing a nucleocascade process. Fundamental significance of this process must be admitted not only in development of wide showers but also in formation of high-energy electron-photon component in lower strata of atmosphere.

Submitted by Acad D. V. Skobel'tsyn 22 Jul 49

PA 149T78

EIPUS, L. KH.

3227. On the generation of a high-energy electronphoton component. G. Ya. Artyukhov, G. T. Satespin, L. I. Sarycheva and L. KH. Eipus Dokl. Akad. Nauk, S S SR, 69 (No. 2) 153-6 (1949) In Russian.

The narrow structure of showers observed when high-energy electrons and photons are emitted is explained by the formation of special showers in the atmosphere; the occurrence of photon showers suggests that photons are present in special showers which become converted into electrons during the passage through the atmosphere. Electrons of energy  $2-3 \times 10^9$  eV were observed. A close connection is established between the electron-photon component and penetrating and nuclear active particles; this agrees with the view that nuclear active particles, which are responsible for the formation of this component at great depth of the atmosphere, are secondary particles.

J. Jacobs

*Phys Inst in Leningrad*

USSR/Nuclear Physics - Cosmic Rays      21 Sep 50  
Showers

"Investigating the Width of Cosmic Particle Showers  
at Sea Level," L. Kh. Rydus, N. M. Blinovs, V. G.  
Videnskiy, L. D. Suvorov

"Dok Ak Nauk SSSR" Vol. LXXIV, No 3, pp 477-480

Wide showers consist of 2 parts: electron-photon  
shower developing according to laws of classical  
cascade theory and extensive periphery formed by  
particles of another origin. Shower particles  
(electrons and photons) can appear in quantity at

17/9/57

USSR/Nuclear Physics - Cosmic Rays      21 Sep 50  
((Contd))

greater distances than according to present cascade  
theory. Submitted 17 Jul 50 by Acad D. V. Skobel'-  
tyn.

17/9/57

EYDUS, L. Kh.

EIDUS, L. Kh.

1868

DISINTEGRATION OF PARTICLES GENERATING ELECTRON-NUCLEAR SHOWERS.

M. I. Podgoretskii, A. L. Lubimov, M. N. Shcherbakova, and L. Kh.

Eidus. Doklady Akad. Nauk. S.S.S.R. 75, 15-17(1950) Nov. 1. (In Russian)

Several recent high-mountain experiments made by various workers in the Pamir pointed to the existence of unstable particles in the component generating electron-nuclear showers. The method consisted generally in comparing coincidence numbers counted at different altitudes, using dense filters to compensate for the altitude difference. It is pointed out that, although data so obtained can also be interpreted as due to a density transition effect, such an interpretation is not generally true, the criterion being the sign of the transition effect. This criterion is applied in an analysis of some of the setups used in the experiments, and the presence of disintegrating particles in the showers under consideration is established. These particles are hardly  $\mu$  mesons; they are probably  $\pi$  mesons having different equilibrium intensities in air and in dense matter.

1ST AND 2ND ORDERS																				3RD AND 4TH ORDERS																			
PROCESSES AND PROPERTIES INDEX																																							
1871																				8																			
<p><b>INVESTIGATION OF THE DENSITY SPECTRUM OF ATMOSPHERIC SHOWERS OF COSMIC RAYS</b> L. K. Etkin, M. M. Alymova, and Y. G. Videnskiy. Doklady Akad. Nauk S.S.S.R. 75, 889-72(1950) Dec. 11. (In Russian)</p> <p>In Doklady Akad. Nauk S.S.S.R. 74, No. 3(1950) a setup has been described which, at distances <math>D</math> not exceeding 80 to 70 m between two pairs of counter groups, registered only the electron-photon component of the extensive showers; at greater distances particles belonging to the "nuclear cascade" were, presumably, responsible for the coincidences observed. This setup was used again in a systematic work, in Moscow, <math>D</math> varying between 2 and 400 m. The magnitude determined was the exponent <math>\kappa</math> in the spectrum formula <math>N(&gt;p) = A/p^\kappa</math>, where <math>N</math> is the number of showers whose densities <math>p</math> exceed a given value, and <math>A</math> and <math>\kappa</math> are altitude-dependent parameters. While increasing slowly at distances <math>D &lt; 70</math> m, <math>\kappa</math> increases rapidly beyond that distance up to <math>D = 170</math> m, then remains unchanged until <math>D = 400</math> m, thus confirming the assumption of two different mechanisms at work in the center and at the periphery of an extensive shower. The larger values of <math>\kappa</math> were found to coincide with those of the exponent in the energy-spectrum formula of the primary rays; this coincidence may not be accidental; it may reflect some feature of the peripheral mechanism.</p>																																							

USSR/Physics - Cosmic Rays, Wide At-  
mospheric Showers 21 Dec 51

"Concerning the Nature and Mechanism of the For-  
mation of Particles of Wide Atmospheric Showers in  
Cosmic Rays," L. Kh. Eydus, Phys Inst Imeni Le-  
bedev, Acad Sci USSR

"Dok Ak Nauk SSSR" Vol LXXXI, No 6, pp 1035-1038

Deduces arguments in favor of the assumption that  
the fundamental properties of showers (for example,  
composition, spatial structure, absorption coeff) are  
dictated by the development of the nuclear component,  
rather than the assumption that the greatest portion

215769

of the energy of showers in the depth of the atmo-  
sphere is included in the electron-photon component to play  
in this case the detg role. Submitted by D. V.  
Stobbel'tsyn 25 Oct 51.

EYDUS, L. KH.

215769

USSR/Physics - Cosmic Rays

Apr 52

"Spatial Distribution of Penetrating Particles in Atmospheric Showers of Cosmic Rays," I. Kh. Eydus, M. I. Adamovich, I. A. Ivanovskaya, V. S. Nikolayev, M. S. Tul'yankina, Phys Inst Imeni Lebedev, Acad Sci USSR

"Zhur Eksper 1 Teoret Fiz" Vol XXII, No 4, pp 440-447

Investigates the spatial distribution of penetrating particles in atm showers by means of counters connected to hodoscopes. Shows that the percent of penetrating particles increases proportionally to the

21 5761

distance to the shower's axis. The total energy of penetrating particles exceeds half of the total energy of the shower. Presents proofs of existence of showers with a complex spatial structure. Indebted to Acad D. V. Skobel'syn, N. A. Dobrotin, G. T. Zetsepin. Received 15 Dec 51.

EYDUS, L. KH.

21 5761

BYKUS, L. KH.

Bykus, L. Kh. -- "An investigation of the properties of extensive Atmospheric Showers of Cosmic Radiation." Cand Phys-math Sci, Physics Inst, Acad Sci USSR, Moscow 1953. (Referativnyy Zhurnal--Fizika, Jan 54)

SO: SO. 161, 22 July 1954



EYDUS, L. Kh.

# USSR

537,591.15  
 5755. Nucleon interactions at high energies and  
 extensive showers. G. T. ZATSEPIN, I. L. ROZENTAL',  
 L. T. SARACHENKA, G. B. KRISTIANSEN AND L. H.  
 CHEN. *Izv. Akad. Nauk SSSR (Ser. Fiz.)* 17, No. 1,  
 39-50 (1954) in Russian.

Summarizes the results of measurements on exten-  
 sive air showers at 3860 m altitude. It is found that  
 the particle density at a distance  $r$  from the shower  
 core varies as  $r^{-n}$  where  $2.7 < n < 3.1$ , for  
 $200 < r < 400$  m. The fraction of penetrating par-  
 ticles increases with  $r$  and reaches 25% at  $r \sim 600$  m.  
 It is concluded that the integral energy spectrum of  
 the primary radiation can be expressed as a power  
 law with exponent between 1.6 and 1.8 for energies  
 up to  $10^{14}$  eV. See also Abstr. 5297 (1952). [Short-  
 ened version of Wataghin's summary (see Abstr. 5747  
 above) which contains 6 diagrams.] H. H. LINT

*Handwritten:* R. 294

B. T. R.  
Vol. 3 No. 3  
Mar. 1954  
Nuclear Physics  
Nucleonics and  
Radiation

3995. Particles From the Cosmos. (Russian.) N. G. Beger  
and M. Kh. Elduz. *Nauka i Zhizn*, v. 20, no. 8, Aug. 1953, p.  
9-11, 13.

Presents a generalized description of  $\gamma$ - and  $\mu$ -mesons. Dis-  
cusses nature of electron-nuclear showers and cascades. Photo-  
graph, diagram.

RMV  
9-13-54

and KHELISTIANSEN, G. B. ZATSEPIN, G. T., ROZENTAL', I. L., SARYCHEVA, L. I.,

"Wide Atmospheric Showers of Cosmic Rays," Usp. Fiz. Nauk SSSR, 49, No. 2,  
pp 185-242, 1953

Translation DSI Trans. No. 31, Jan 1954.

KYDUS, L.Kh.

Cosmic rays. Priroda 43 no.7:10-20 J1 '54. (MLRA 7:7)  
(Cosmic rays)

USSR/ Chemistry - Biochemistry

Card 1/1 Pub. 22 - 22/40

Authors : Kuzin, A.M., and Eydus, L. KH.

Title : Deuteration of acetone in the presence of amino acids

Periodical : Dok. AN SSSR 99/3, 421-422, Nov 21, 1954

Abstract : The rate of penetration of deuterium into the acetone molecule and the effect of amino acid - glycocoll - on the process of acetone deuteration, were investigated. The rate of acetone deuteration in the absence of glycocoll was found to be low, and less than 1% of the total number of hydrogen atoms in the acetone underwent a change. The accelerating effect of glycocoll was proven. The formation of an enol form in the acetone under the effect of glycocoll was established. Seven references: 5-USSR and 2-German (1934-1951). Table; graph.

Institution : Academy of Sciences USSR, Institute of Biophysics

Presented by : Academician A.I. Oparin, September 11, 1954

Effect of Röntgen rays on some properties of proteins and their synthesis using labeled compounds. A. M. Kuzin, L. Kh. Bidus, and N. B. Strazhevskaya (Inst. Biol. Phys., Acad. Sci. U.S.S.R., Moscow). Doklady Akad. Nauk S.S.S.R. 102, 267-70 (1955).—Plants were x-irradiated 6 min. with a dose of 1000 r. The exptl. and control plants were allowed to grow in the same soil, for 24 hrs. At the end of this period, the root and stem were sep'd., the protein extd. with 10% NaCl soln., pptd. with trichloroacetic acid, washed twice with EtOH and three times with ether. When the plants were grown on  $D_2O$ , the ratio of  $D_2O$  found in the proteins isolated from exptl. plants to that found in the controls was 0.84 for root tissue and 0.73 for stem tissue. In expts. in which the soil contained glycine- $C^{14}$  (I) (20-60 mc./ml.), the av. ratio of  $C^{14}$  in exptl. plants to that in controls was 1.42 for stem tissue and 1.30 for root tissue. This high value was caused by the adsorption of labeled I on the isolated proteins. When the protein was dissolved in dil. alkali in the presence of an excess of unlabeled I and reprecipd., the av. ratio of  $C^{14}$  activity in exptl. plants to that in controls was 0.87. E. L. Seregin

3

WILSON, J.G., editor; BYDUS, L.Kh. [translator]; GUROV, K.P., redaktor;  
NIKIFOROVA, A.N., tekhnicheskiiy redaktor

[Progress in cosmic ray physics. Translated from the English] *Fizika kosmicheskikh luchei; sovremennye dostizhenia*. Sostavleno gruppoi avtorov, pod red. Dzh.Vil'sona. Perevod s angliiskogo L.Kh.Bidusa. Moskva, Izd-vo inostrannoi lit-ry, Vol.2. 1956. 279 p. (MIRA 9:11)  
(Cosmic rays)

EYDUS, L. KH.

"On the Primary Mechanism of the Biological Action of Radiation,"  
by L. Kh. Eydus, Institute of Biological Physics, Academy of Sci-  
ences USSR, Moscow, Biofizika, Vol 1, No 6, 1956, pp 544-554

The author attempts to explain certain experimentally observed char-  
acteristics of the effect of radiation on living organisms, based on given  
concepts of the primary mechanism of the action of radiation.

It has been established that ionizing radiation exerts both a direct  
effect on macromolecules and an indirect effect (by means of the products  
resulting from the radiolysis of fluid in which are found biologically im-  
portant molecules of proteins, nucleic acids, etc.). The existence of  
prolonged conservation of energy, absorbed by an organism on irradiation,  
permits more accurate definition of the concept of "primary" and "secondary"  
effects. The primary process is the process of absorption of the radiant  
energy by the organism and subsequent utilization of this energy for the  
breakdown of the chemical bonds in the organism, as a result of which the  
microstructure of the organism is disrupted. This disturbance results in  
a disturbance of the metabolism related to this structure, i.e., it produces  
secondary processes. The fractional amount of the absorbed energy which  
acts directly depends on the organism. The appearance of the conserved  
portion of the energy is strongly dependent on temperature. This has been  
observed in experiments where the organism was incubated after irradiation.

Approximately one third of the 47 references listed are Soviet. (U)

54M.1374



**BOLOARINA, V.P.; MYDUS, L.Kh.**

Radiation method for determining the green bulk of standing plants.  
Biofizika 1 no.7:653-656 '56. (MIRA 9:12)

1. Institut biologicheskoy fiziki Akademii nauk SSSR, Moskva.  
(PHOSPHORUS--ISOTOPES)  
(PLANTS, EFFECT OF RADIATION ON)

EYDUS, L. Kh.

*cyw* Movement of nutrient substances in the plant. A. M. Kuzin, V. I. Merenova, and L. Kh. Eidus (Biophys. Inst., Moscow). *Fiziol. Rastenii* 3, 121-4 (1956). Tests with kidney-bean plants utilizing  $D_2O$  (20% soln. for root immersion), and  $C^{14}$ -labeled  $AcONa$  (labeled in  $CO_2H$  group), showed that the  $C^{14}$  enters rapidly the leaves of the plant under conditions of illumination, as does the  $D_2O$ . Darkness retards this movement. G. M. Kosolapoff

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270-2.1.60

BYDUS, L.Kh.; KALAMKAROVA, M.B.; OTAROVA, G.K.

Migration mechanism of protection against radiation effects.  
Biofizika 2 no.5:573-580 '57. (MIRA 10:11)

1. Institut biologicheskoy fiziki AN SSSR, Moskva.  
(X-RAYS—PHYSIOLOGICAL EFFECT) (PROTEINS)

EYDUS, L.Kh.

KUZIN, A.M., prof., otvetstvennyy red.; LIVSHITS, N.N., red.; SHAPIRO, F.B., red.; EYDUS, L.Kh., red.; IOFFE, V.G., red. izd-va; POLYAKOVA, T.V., tekhn. red.

[Radiobiology; proceedings of a conference] Radiobiologiya; trudy konferentsii. Moskva, Izd-vo Akad. nauk SSSR, 1958. 286 p.  
(MIRA 11:5)

1. Vsesoyuznaya nauchno-tekhnicheskaya konferentsiya po primeneniyu radioaktivnykh i stabil'nykh izotopov i izlucheniya v narodnom khozyaystve i nauke, 1957. 2. Institut biofiziki AN SSSR (for Kuzin)

(RADIATION--PHYSIOLOGICAL EFFECT)

COUNTRY : USSR B  
CATEGORY : General Biology.  
Physical and Chemical Biology.  
ABS. JOUR. : RZhBiol., No. 5, 1959, No. 18963  
AUTHOR : Kydus, L. Kh.; Kondakova, N.V.; Otarova, G. K.  
INST. : -  
TITLE : The Mechanism of the "Oxygen Effect" in  
Radiobiology.  
ORIG. PUB. : Biofizika, 1958, 3, No 2, 215-219  
ABSTRACT : It was shown that in a 4 mg/ml concentration,  
a myocin (I) solution which was freed from air  
and subjected to an X-ray irradiation of  
50,000 r in vacuum cuvettes, almost completely  
preserved its ATP (adenosine triphosphate)  
activity which may also be determined in  
anaerobic conditions by incubation with ATP,  
while irradiation with the very same dosage  
in aerobic condition leads to a 48 percent  
inactivation of I. After air is admitted into  
cuvettes which contain the irradiated solution,

Card:

1/3

1

EYDUS, L.Kh., KONDAKOVA, N.V.

Mechanism of photodynamic effects. Biofizika 3 no.5:562-567 '58  
(MIRA 11:10)

1. Institut biologicheskoy fiziki AN SSSR, Moskva  
(LIGHT, effects,  
photodynamic eff. on biol. objects in presence  
of stein (Rus))

AUTHORS: Medvedeva, G. B., Eydus, L. Kh. 20-118-5-54/59

TITLE: Marked Atoms, as Applied for Investigating the Fertilization Process in Plants  
(Primeneniye mechenykh atomov k izucheniyu protsessa oplodotvoreniya u rasteniy)

PERIODICAL: Doklady Akademii Nauk SSSR, 1958, Vol. 118, Nr 5, pp. 1037-1039 (USSR).

ABSTRACT: It was proved in the course of the last years that the number of the pollen tubes growing through the pistil do not at all represent a "guarantee fund" which has to guarantee success to one single tube. These "excess" tubes are included in complicated metabolic processes and play a certain and not at all unimportant role in fertilization. Thus, the fertilization process is not restricted to the union of male and female gametes. The quantity of pollen participating in pollination has proved to be a most important factor which guarantees not only normal budding of the seeds but also high viability of their offspring. (references 1 - 3). The problem of the influence of the quantity of pollen on hereditary marks of the offspring was less clear.

Card 1/4

Marked Atoms, as Applied for Investigating the  
Fertilization Process in Plants

20-118-5-54/59-1

However, an increased paternal influence had to be excepted in the case of a greater quantity of pollen tubes. The authors had made it their object to determine the dependence of the distinctness of the paternal characteristics in the case of the hybrids of the first generation on the quantity of substance of the pollen tubes which have reached the embryo sac. For this purpose corn was used (paternal species - yellow seeds, maternal species - white seeds). The substance of the pollen tubes contained in the hybrid seeds of different color was to be determined quantitatively. For the solution of this problem the method (according to reference 5) of the saturation of the pollen with radioactive sulfur isotope ( $S^3$ ) was used. Moreover, the spikes isolated before were pollinated with this radioactive pollen and radioactivity of ripe hybrid seeds divided into fractions according to the color intensity of their endosperm was recorded. The higher radioactivity of the glaring yellow fractions compared to the white or pale colored might serve as an index of direct dependence of the quantity of paternal substance on the degree of the distinctness of the paternal characteristics. The experiments comprised two growing seasons: 1955 and 1956. The panicles of the paternal species were

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Marked Atoms, as Applied for Investigating the  
Fertilization Process in Plants

20-118-5-54/59

plunged in parchment parcels into a solution of radioactive materials (in 1955  $\text{Na}_2\text{SO}_4$ , in 1956 methionine). The pollen was used for pollination after each portion had been investigated as to radioactivity. The radioactivity was computed per one pollen grain. The radioactivity of the seeds was determined by their ashing and then computed per 1 seed. This made possible an approximated determination of the number of pollen grains having participated in the fertilization of a corn seed. It can be seen from table 1 that within every spike yellow seeds were much less radioactive than the white seeds. This holds also for the computation of the differently colored seeds per 1 g of their dry weight. Concentration of radioactivity was equal in the embryo and the endosperm while it was by 40% weaker in the shells. The method of the marked atoms made possible the determination of the direct dependence of the number of the pollen tubes which have entered the embryo sac and the distinctness of the paternal characteristics of the coloring of the seeds of the first generation. The yellow color of the endosperm due to the paternal producer dominates only in the case of a sufficient quantity of pollen

Card 3/4

SHCHEPOT'YEVA, Ye.S.; ARDASHNIKOV, S.N.; LUR'YE, G.Ye.; RAKHMANOVA, T.B.;  
EYDUS, L.Kh., red.; ZUYEVA, N.K., tekhn.red.

[Oxygen effect in the action of ionizing radiations] Kislorodnyi  
effekt pri deistvii ioniziruiushchikh izlucheni. Moskva, Gos.  
izd-vo med.lit-ry, Medgiz, 1959. 184 p. (MIRA 12:12)  
(RADIATION--PHYSIOLOGICAL EFFECT) (OXYGEN)

EYDUS, L.Kh.; GANASSI, Ye.E.

Studies on the mechanism of radiation "aftereffect" in proteins  
[with summary in English]. Biofizika 4 no.2:215-223 '59.

(MIRA 12:4)

1. Institut biologicheskoy fiziki AN SSSR, Moskva.

(MUSCLE PROTEINS,

myosin solution, after-eff. of x-irradiation (Rus))

(ROENTGEN RAYS, effects,

on myosin solution, after-eff. (Rus))

KYDUS, L.Kh.

After effect of photodynamic action. Biofizika, 4 no.3:378-379 '59.  
(MIRA 12:7)

1. Institut biologicheskoy fiziki AN SSSR, Moskva.

(RADIATIONS, eff.

after eff. in photodynamic eff. (Ris))

BYDUS, L.Kh.; OTAROVA, G.K.

The existence of certain enzymatically active conditions of myosin with various degrees of heat sensitivity. Biokhimiia 24 no.6:982-992 M-D '59. (MIRA 13:5)

1. Institute of Biological Physics, Academy of Sciences of the U.S.S.R., Moscow.  
(MUSCLE PROTEINS chem.)

EYDUS, L. Kh

23

PHASE I BOOK EXPLOITATION SOV/5628

Akademiya nauk SSSR. Institut biologicheskoy fiziki

Rol' perekisey i kisloroda v nachal'nykh stadiyakh radiobiologicheskogo effekta (Role of Peroxides and Oxygen During Primary Stages of Radiobiological Effects) Moscow, 1960. 157 p. 4,500 copies printed.

Responsible Ed.: A. M. Kuzin, Professor; Ed. of Publishing House: K. S. Trinchin; Tech. Ed.: P. S. Kashina.

PURPOSE : This collection of articles is intended for scientists in radiobiology and biophysics.

COVERAGE: Reports in the collection deal with the role of peroxides and oxygen in the primary stages of a radiobiological effect. They were presented and discussed at a symposium held December 25-30, 1958, organized by the Institut biofiziki AN SSSR, (Institute of Biophysics, AS USSR). Twenty-eight Moscow scientists, radiobiologists, radiochemists, physicists, and

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Role of Peroxides and Oxygen (Cont.)

SOV/5628

physical chemists took an active part in the symposium. Between the time of its conclusion and the publication of the present book some of the materials were expanded. In addition to the authors the following scientists participated in the discussion: L. A. Tummerman, V. S. Tongur, G. M. Frank, Yu. A. Kriger, E. Ya. Grayevskiy, N. N. Demin, B. N. Tarusov, and I. V. Vereshchenskiy. References follow individual articles.

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Pasynskiy, A. G., and T. Ye. Pavlovskaya [Institute of Biochemistry imeni A. N. Bakh, AS USSR]. Dependence of the Oxygen Effect on the Correlation of the Dose and the Substrate Concentration in Irradiated Cysteine Solutions		153

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Card 5/5

JA/dfk/jw  
10-6-61



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S/829/60/000/000/005/005  
D243/D308

271220

AUTHOR: Lydus, I.Kh.

TITLE: The significance of the peculiarities of energetic states of macromolecules for understanding radio-biological phenomena

SOURCE: Fiziko-khimicheskiye i strukturnyye osnovy biologicheskikh yavleniy; sbornik rabot. Inst. biol. fiz. AN SSSR, Moscow, Izd-vo AN SSSR, 1960, 133-141

TEXT: Attempts to understand the action of radiation on living organisms have ignored the structural peculiarities of biological macro-molecules. The reaction between radiation and biological structures has two aspects: the absorption of energy and its subsequent utilization by the object. The second aspect is generally ignored and needs to be reconsidered. The migration of absorbed energy to 'weak' spots in the structure of the organism, and the conservation of part of the energy in so-called 'excited' states, which exhibit a disturbed electron structure are discussed. The physio-

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D243/D308

The significance ...

logical and physico-chemical nature of radiation 'after-effects' is considered and the reaction of objects, after radiation, to a fall in temperature is explained in terms of the 'excited' states. A comprehensive theory to cover both migration and conservation of energy in macromolecular structures has not yet been developed. Some experiments on myosin are described, which use adenosine triphosphatase activity to estimate radiation sensitivity, and (a) seek to prove the occurrence of migration and conservation of energy and (b) analyze the radiobiological phenomena, assuming the occurrence. A protective mechanism is suggested which involves the transfer via conductors of radiation energy from the protected object to the protector. This mechanism was confirmed when actin was made to form a complex with previously irradiated myosin, then withdrawn and the adenosine triphosphatase activity of the irradiated myosin measured before and after complex formation. Protection of irradiated complex was also demonstrated. The role of oxygen in radiobiological phenomena is considered to involve a two-stage process in which oxygen acts by reacting with 'excited' molecules and inactivating them, and not by participating in water radiolysis. This view is support-

Card 2/3

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D243/D308

The significance ...

ed by P. Alexander (Rad. Res. 6, 653, 1957). The reaction seems to be applicable generally but the physical mechanism of the oxygen-'excited' molecule reaction is still unclear. Finally, the possible relation between 'excited' states and the toxic factors which appear at the time of radiation are considered. There are 6 references.

ASSOCIATION: Institut biologicheskoy fiziki AN SSSR, Moskva  
(Institute of Biological Physics, AN USSR, Moscow)

Card 3/3

EYDUS, L.Kh.; KAYUSHIN, L.P.

Long-lasting conservation of unpaired electrons in macromolecules  
following irradiation of protein solutions. Dokl. AN SSSR 135 no.6:  
1525-1527 D '60. (MIRA 13:12)

1. Institut biologicheskoy fiziki Akademii nauk SSSR. Predstavleno  
akademikom N.M. Sisakyanom,  
(GAMMA RAYS--PHYSIOLOGICAL EFFECT) (PROTEINS)  
(ELECTRONS)

EYDUS, L.Mh.; GANASSI, Ye.E.

Existence of several types of latent injuries in irradiated myosin molecules. Biofizika 5 no.3:334-338 '60. (MIRA 13:7)

1. Institut biologicheskoy fiziki AN SSSR, Moskva.  
(MYOSIN) (GAMMA RAYS—PHYSIOLOGICAL EFFECT)

EYDUS, L.Kh.; GANASSI, Ye.E.

Analyzing the action of principal physical factors modifying  
radiosensitivity. Biofizika 5 no. 5:523-532 '60. (MIRA 13:10)

1. Institut biologicheskoy fiziki AN SSSR, Moskva.  
(RADIATION--PHYSIOLOGICAL EFFECT) (ELECTRONS)

GANASSI, Ye.E.; KONDAKOVA, N.V.; OTAROVA, G.K.; EYDUS, L.Kh.

Common features of the manifestation of radiation aftereffect in proteins of different structure; comparative investigation of myosin and pepsin. Radiobiologiya 1 no.1:14-22 '61; (MIRA14:7)

1. Institut biologicheskoy fiziki AN SSSR, Moskva.  
(GAMMA RAYS—PHYSIOLOGICAL EFFECT) (MYOSIN)  
(PEPSIN)

28677

S/020/61/140/002/023/023  
B103/B101

27.12.20

21.7.200

AUTHORS: Bzdug, L. Kh., Ganassi, Ye. E., and Otarova, G. K.

TITLE: The role of water in the irradiation "aftereffect"

PERIODICAL: Akademiya nauk SSSR. Doklady, v. 140, no. 2, 1961. 475-478 X

TEXT: The authors report on experiments concerning the thermal inactivation of intact pepsin and pepsin irradiated with  $Co^{60}$   $\gamma$ -rays. The results confirmed the assumption saying that the aftereffect of irradiation is caused by water. The role of water was explained by comparing the after-effects in the presence and absence of water. The decrease of the proteolytic activity of pepsin, determined from the specific absorption (at  $\lambda = 280$  m $\mu$ ) of the proteolytic products of hemoglobin, was used as a criterion of its damages. Pepsin solutions were studied in acetate buffer solution (pH = 4.65-4.80) or in anhydrous glycerol (adjusted to pH = 4.6 by acidification with glacial acetic acid). The pepsin was obtained by the Northrop method as modified by G. A. Levdikova (Vopr. med. khimii, 2, 53 (1956)). In the laboratory of Professor A. S. Kuz'minskiy, Vsesoyuznyy nauchno-issledovatel'skiy institut rezinovoy promyshlennosti (All-Union Card 1/4



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S/020/61/140/002/023/023

B103/B101

The role of water in the ...

Scientific Research Institute of the Rubber Industry), dry pepsin was irradiated with a  $\text{Co}^{60}$   $\gamma$ -radiation dose of  $10^4$  r/min. The irradiation of the pepsin solutions with  $\text{Co}^{60}$  was carried out with the  $\text{RVB3-800}$  (GUBE-800) device of the Institut biofiziki AN SSSR (Institute of Biophysics, AS USSR) with a dose of  $\sim 500$  r/min and at room temperature. The thermal inactivation of the dry pepsin was performed a) in an air thermostat ( $100-130^\circ\text{C}$ ), b) in an ultrathermostat filled with glycerol ( $130-150^\circ\text{C}$ ); pepsin solutions were inactivated in the ultrathermostat. It has previously been shown (E. Ye. Ganassi et al., Radiobiologiya, 1, no. 1 (1961); Ref. 6, see below) that irradiation causes latent damages in both dissolved and dry pepsin, which account for the thermal aftereffect. In both cases, the protein incubated in solution after irradiation is inactivated more quickly than the intact one, and partly loses its activity. This loss characterizes the "intensity" of the aftereffect, and increases with increasing direct radiation damage. To explain the role of water in the thermal aftereffect, dry pepsin was irradiated with 5 to 11 million r and then exposed to temperatures of  $100-150^\circ\text{C}$ . At the same time, dry, non-irradiated pepsin was incubated under equal conditions. The time of incubation differed as a result of the temperature

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B103/B101

The role of water in the ...

dependence of the rate of thermal inactivation. Intact and irradiated proteins showed the same rate. The ratio was  $1.00 \pm 0.002$ , which indicates the absence of a thermal aftereffect. It is noted that either the high temperature exerts a protective action, so that there are no latent damages in the protein after incubation, or water is indispensable for the occurrence of an aftereffect. In order to prove this, the protein which had been thermally inactivated in dry state, was dissolved in acetate buffer and incubated in solution between 47 and 54°C. At these temperatures the thermal aftereffect was noticeable. Its activation energy was equal to that of protein which had not been heated prior to dissolution. The intensity of the irradiation aftereffect depended only on the dose, but neither on the time nor on the temperature of the preceding heating of the irradiated, dry protein. Thus, heating does not eliminate the causes of the aftereffect, but without water the latter did not become manifest. The authors attempted to prove in how far the role of water in this aftereffect is a specific property of water. Pepsin irradiated in dry state was dissolved in anhydrous glycerol. Also in this case the irradiated pepsin was inactivated at the same rate as the intact one. Hence, there is no thermal aftereffect under these conditions. Protein heated in

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The role of water in the ...

glycerol was dissolved in an acetate buffer solution, and exhibited a typical thermal aftereffect whose intensity was determined only by the radiation damage. The results obtained indicate that water is required for the manifestation of latent damages responsible for the thermal aftereffect of irradiation. Also the detrimental action of oxygen will not become manifest without water. There are 2 figures, 2 tables, and 8 references: 6 Soviet and 2 non-Soviet. The two references to English-language publications read as follows: Ref. 6: R. S. Anderson, Brit. J. Radiol., 27, 56 (1954); Ref. 8: D. L. Dewey, Nature, 197, 1008 (1960).

ASSOCIATION: Institut biologicheskoy fiziki Akademii nauk SSSR  
(Institute of Biophysics of the Academy of Sciences USSR)

PRESENTED: April 10, 1961 by N. M. Sisakyan, Academician

SUBMITTED: March 30, 1961

Card 4/4

EVDLS, L. KH.

Mode of Action of Factors Modifying the Effect of Ionizing Radiation on Protein

E. E. Ganayev and L. Kh. Filus

The effect was investigated of various physical and chemical factors (heat, oxygen, water, protective chemical substances, etc.) which modify radiation injury to proteins.

Oxygen had no effect on the inactivation of pepsin in aqueous solution. However, the 'oxygen effect' is observed in the presence of some chemicals (e.g. sodium metabisulphite). When protein solutions were irradiated in an acetate or phosphate buffer or in the presence of some other substances, an 'inverse' oxygen effect was observed and the inactivation of the enzyme was reduced in the presence of oxygen.

When dry pepsin was irradiated, that part of the enzyme which remained active had latent injuries which caused the appearance of the 'thermal' after-effect. It was shown that the 'thermal' after-effect requires the presence of water: when the irradiated enzyme is heated in the dry state or dissolved in anhydrous glycerol, the latent injuries do not appear and the after-effect cannot be observed. The irradiated enzyme is inactivated by heat in the same way as the non-irradiated one. The 'thermal' after-effect can be detected only in solution.

Myosin solutions irradiated anaerobically give an after-effect caused by heat and  $O_2$ . It was shown that each of these two agents acts on only one of two different kinds of latent injury which arise in the enzyme molecule.

The study of the effect of various chemicals on the radio-sensitivity of pepsin disclosed the existence of an apparently non-specific mechanism of protection, discussed in the report.

*Institute of Biophysics, Academy of Sciences of the USSR, Moscow*

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report presented at the 2nd Intl. Congress of Radiation Research,  
Harrogate/Yorkshire, Ot. Brit. 5-11 Aug 1962

FDLS, L. KH.

*Latent Lesions During Radiation-Induced Inactivation of Enzymes*

L. Kh. ~~FDLS~~, E. E. Gusev and N. V. Kondakova

$\gamma$ -radiation produces in the same protein molecules latent lesions of two kinds, one of which causes the inactivation of the enzyme during subsequent access of oxygen, and the other during post-radiation heating. The damage due to the combined after-effects in irradiated solutions of myosin is a large proportion of the total radiation damage.

The 'thermal' after-effect in myosin and pepsin enzymes of different nature and function is caused by the transition of some molecules to a state with a low activation barrier to thermo-inactivation. The degree of the 'thermal' after-effect and its energy of activation do not depend on whether the enzyme was irradiated dry or in solution. The method of electron paramagnetic resonance revealed in these enzyme molecules the presence of unpaired electrons with a long lifetime after irradiation in solution. These unpaired electrons are closely related to the radiation after-effect, and they disappear when the irradiated solutions are gently heated; at the same time the 'thermal' after-effect is obtained.

The same latent lesions as those after  $\gamma$ -irradiation were observed in the study of the photodynamic effect (PDE) in solutions of these enzymes in the presence of methylene blue or eosin. This is borne out by the activation barriers of the 'thermal' after-effect, the long lifetime of unpaired electrons, the form of the electron paramagnetic resonance spectra, and by other criteria which are identical for  $\gamma$ -radiation and for visible light (PDE). The mechanism of the formation of latent lesions due to the PDE, and the part played by  $O_2$ , are reported. Conclusions are drawn about the mechanism of inactivation of enzymes by ionizing radiation and by PDE, suggesting two stages, one of which is the formation of long-lived or short-lived latent lesions of the macromolecules.

*Institute of Biophysics, Moscow, USSR*

report presented at the 2nd Intl. Congress of Radiation Research,  
Harrogate/Yorkshire, Gt. Brit. 3-11 Aug 1962

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S/205/62/002/002/015/015

1020/1215

AUTHORS: Ganassi, Ye. E. and Eydu, L. Kh.

TITLE: A possible general operating mechanism of protective agents

PERIODICAL: Radiobiologiya, v. 2, no. 2, 1962, 332-334

TEXT: Loss in proteolytic activity of a 0.02 mg/ml aqueous pepsin solution (pH 4.5-4.6) exposed to  $Co^{60}$  gamma rays was examined by Anson's method. AET, sodium nembutal, cystamine, sodium metabisulfate and  $\beta$ -alamine were used as protective agents. The inactivation of pepsin depends exponentially upon the radiation dose and the protein concentration. It is suggested that a part of the molecule is blocked by the protective agent so that inactivating factors (free water radicals or oxygen) have no access to it. The enzyme itself is composed of two parts: one part is rapidly inactivated and its dose/inactivation dependence is the same as in the unprotected enzyme; the second part is practically not inactivated over a wide dose range. Some molecules are unblocked after a while and inactivated before being blocked again. Increased temperature during irradiation, and a longer irradiation period (with a decreased dose rate) brought about a more extensive inactivation of the blocked part of the enzyme. There is a direct dependence between the molecular size of the protective agents and their protective effect. The mechanism described is non-specific since different agents showed the same effect.

SUBMITTED: January 5, 1962.

Card 1/1

EYDUS, L.kh.

Hypothesis of the physical nature of the forces of muscular contraction. Dokl. AN SSSR 147 no.5:1204-1207 D '62.

(MIRA 16:2)

1. Institut biologicheskoy fiziki AN SSSR. Predstavleno akademikom N.M. Sisakyanom.

(MUSCLE--MOTILITY)

EYDUS, L.Kh.

Mechanism of muscle contraction. Biofizika 7 no.6:683-690  
'62. (MIRA 17:1)

1. Institut biologicheskoy fiziki AN SSSR, Moskva.



L 11247-63

ACCESSION NR: AP3001071

EWT(1)/EWT(m)/BDS--AFPTC/AMD/ASD--RM/AR/K

8/0205/63/003/003/0440/0446

62

59

19

AUTHOR: Ganassi, Ye. E.; Eydus, L. Kh.; Arifulina, R. A.

TITLE: Investigation in vitro of the action mechanism of chemical protective substances. Report 1

SOURCE: Radiobiologiya, v. 3, no. 3, 1963, 440-446

TOPIC TAGS: aminoethylisotiuron (AET), vinbarbital sodium, mercamine, bisulfate sodium, pepsin solution, gamma radiation, action mechanism

ABSTRACT: Most protective action theories are based on the known properties of a given protective substance itself rather than a mechanism common to protective substances. The present work investigates systematically the protective action of aminoethylisotiuron (AET), vinbarbital sodium, mercamine, bisulfate sodium, and beta-alanin, to which different action mechanisms have been attributed. The action mechanisms were studied by means of radiation inactivation of pepsin water solutions which were gamma irradiated from Co sup 60 or Cs sup 137 sources at 370 r/min. Radiation inactivation of pepsin in water takes place according to an exponential law, that is, the power of radiation increases with decrease of solution concentration. Figures 1-4 show pepsin irradiation inactivation in the presence of different protective substance concentrations. By analyzing the change of these dosage curves

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ACCESSION NR: AP3001071

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in the presence of the various protective substance concentrations, a mechanism common to all the protective substances is determined. Each substance apparently blocks radiosensitive parts of the protein molecule surface from oxygen access for a sufficiently prolonged time and this prevents hidden injuries of the "oxygen" type. "The authors express their gratitude to the doctor of biological sciences N. I. Shapiro and V. I. Suslikov for valuable remarks in discussing the study." Orig. art. has: 7 figures, 1 table.

ASSOCIATION: Institut biologicheskoy fiziki AN SSSR, Moscow (Institute of Biological Physics AN SSSR)

SUBMITTED: 01Oct62

DATE ACQD: 01Jul63

ENCL: 00

SUB CODE: 00

NO REF SOV: 013

OTHER: 012

oh/wm  
Card 2/2

EYDUS, I., Kh.

Nature of "inverse" oxygen effect in ionizing radiation.  
Radiobiologiya 3 no. 6:920-922 '63. (MIRA 17:7)

1. Institut biologicheskoy fiziki AN SSSR, Moskva.

GANASSI, Ye.E.; EYDUS, L.Kh.; ARIFULINA, R.A.

Participation of oxygen in the radiation inactivation of dry  
enzymes. Radiobiologiya 4 no.1:41-46 '64. (MIRA 17:4)

1. Institut biologicheskoy fiziki AN SSSR, Moskva.

ACCESSION NR: AP4027988

S/0205/64/004/002/0329/0334

AUTHOR: Eydus, L. Kh.

TITLE: Discussion. Oxygen participation in radiobiological effects

SOURCE: Radiobiologiya, v. 4, no. 2, 1964, 329-334

TOPIC TAGS: oxygen effect, oxygen effect popular hypothesis, oxygen effect new hypothesis, latent radiation injury, radiation injury reparation, water radical, sulfhydryl radical, macromolecule injury, repairing radical, partial oxygen tension, oxygen effect absence

ABSTRACT: The author disagrees with the popular hypothesis that in ionizing radiation the oxygen effect is dependent on competition between oxygen and sulfhydryl protectors, the hydrogen donors, for latent injuries in the macromolecules. A new oxygen effect hypothesis is offered based on the following positions: a) with indirect radiation action, OH radicals (so-called water radicals), formed as a result of water radiolysis, produce latent injuries by damaging the biologically important macromolecules, b) if there are low molecular admixtures present in the solution besides the macromolecules, then

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ACCESSION NR: AP4027988

the water radicals may be taken over by them to form admixture radicals, c) latent injuries of macromolecules (or at least part of them) before being realized into visible injuries may be repaired by interaction with certain admixture radicals (so-called repairing radicals, RR), particularly sulfhydryl compounds, and d) oxygen, present in the medium during irradiation, in interaction with the repairing radicals (RR) disactivates them. The degree of damage with the same admixtures increases in the presence of oxygen compared to anaerobic irradiation. Thus, according to the popular hypothesis reparation is accomplished by the molecules of the admixture itself and oxygen effect takes place when admixture molecules (RR) interact with oxygen. According to the new hypothesis, the admixture molecules (RR) do not interact with oxygen. Reparation is accomplished by the admixture radicals (RR) and the oxygen effect takes place when oxygen interacts with the admixture radicals (RR). The following aspects of the new oxygen effect hypothesis are discussed: dependence of oxygen effect value on partial oxygen tension, relation between "direct" and "reverse" oxygen effect, absence of oxygen effect with intense ionizing radiation action, and absence of chemical protection with intense ionizing radiation action. "The author expresses his gratitude to

Card 2/3

ACCESSION NR: AP4027988

Professor Ya. L. Shekhtman, Ye. E. Ganassi, and V. I. Suslikov for  
valuable discussion." Orig. art. has: 2 figures and 1 table.

ASSOCIATION: Institut biologicheskoy fiziki AN SSSR, Moscow  
(Biological Physics Institute AN SSSR)

SUBMITTED: 20Sep63

DATE ACQ: 28Apr64

ENCL: 00

SUB CODE: LS

NR REF SOV: 007

OTHER: 004

Card 3/3

GRAYEVSKIY, E.Ya.; KOROGODIN, V.I.; KUZIN, A.M., ; MOSKALEV,  
Yu.I.; SMIRNOV, K.V.; STREL'TSOVA, V.N.; SHAPIRO, N.I.,  
doktor biol. nauk; SHIKHOMYROV, V.V.; EYLU3, L.Kh.;  
ALEKSAKHIN, R.M., red.

[Principles of radiobiology] Osnovy radiatsionnoi bio-  
logii. Moskva, Nauka, 1964. 402 p. (PIRA 18:1)

1. Akademiya nauk SSSR. Institut biologicheskoy fiziki.
2. Chlen-korrespondent AN SSSR (for Kuzin).



SAFIYAZOV, Zh.; MYRIS, L.Kh.

Radiation aftereffect phenomenon in irradiated *Bacillus megaterium*  
spores. Radiobiologiya 5 no.1:22-34 '65.

(MIRA 18:3)

1. Institut mikrobiologii AN SSSR i Institut biologicheskoy fiziki  
AN SSSR, Moskva.

L 9871-66 EWT(m)

ACC NR: AF5026992

SOURCE CODE: UR/0020/65/164/005/1171/1174

AUTHOR: <sup>44.55</sup> Eydus, L. Kh.; <sup>44.55</sup> Otarova, G. K.; <sup>44.55</sup> Sisakyan, N. M. (Academician) 36  
25

ORG: IBFANS

ORG: Institute of Biological Physics, AN SSSR (Institut biologicheskoy fiziki AN SSSR) <sup>44.55</sup>

TITLE: Screening of macromolecules from latent radiation damage

SOURCE: AN SSSR. Doklady, v. 164, no. 5, 1965, 1171-1174 <sup>19.44.55</sup>

TOPIC TAGS: gamma ray, radiation damage, enzyme, myology

ABSTRACT: Under the influence of ion-emission the inactivation of many enzymes proceeded in two stages. First, a latent damage was developed in the albumin molecules, and then the latent damage was converted into an apparent damage under the action of heat and oxygen. This process was associated with a partial expansion of the molecules accompanied by a loss in shape, depending on the enzymic condition of the albumin. If the conditions preventing the expansion of molecules could be

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UDC: 557.391

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found, then these could also eliminate radiation damage. Such conditions could be created synthetically. The experiments were conducted with solutions of myosin (M) in 0.5M KCl, irradiated by  $Co^{60}$   $\gamma$ -rays. In a first series of experiments ATP (adenosine triphosphate) was added to a myosin solution in amounts of 0.1-0.5%. The solutions were incubated at 37 C. These experiments proved that in the presence of ATP the activity of the intact albumin as well as nearly all the albumin with latent damage was not disrupted. However, the assumption that ATP might repair the latent damage was not confirmed, as ATP only prevented the development of latent damage. The screening effect of admixtures was produced because their molecules were absorbed on the albumin, preventing the partial expansion of damaged molecules in the second stage of inactivation. Orig. art. has: 4 diagrams.

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